CLAIMS

We claim:

1. A process monitor for determining process parameters during a plasma etch process of a wafer, the process monitor comprising:

a flash lamp emitting a broad-band optical radiation;

a spectrograph responsive to optical radiation reflected from the wafer; and

a data processing element for processing a first signal from the spectrograph, the first signal representative of emitted optical radiation reflected from the wafer, and determining a process parameter.

2. A process monitor according to claim 1 further comprising a beam forming module operable to collimate the emitted optical radiation.

3. A process monitor according to claim 2 wherein the collimated optical radiation is incident normally to the wafer.

4. A process monitor according to claim 1 wherein a spectrograph integration period is synchronized to the flash lamp.

5. A process monitor according to claim 1 wherein a second signal representative of optical radiation reflected from the wafer during a period when the flash lamp is not emitting broad-band optical radiation is processed by the data processing element and subtracted from the first signal to determine a process parameter.

6. A process monitor according to claim 1 wherein a third signal representative of the intensity of the emitted radiation is processed by the data processing element to normalize the first signal.

7. A process monitor according to claim 6 wherein the normalized first signal is processed by the data processing element to determine the process parameter.

8. A process monitor according to claim 1 wherein the process parameter further comprises a thickness of a layer carried by the wafer.

9. A process monitor according to claim 1 wherein the process parameter further comprises an etch rate of a layer carried by the wafer.

10. A process monitor according to claim 1 wherein the process parameter further comprises a process endpoint.

11. A process monitor for determining process parameters during a plasma deposition process of a wafer, the process monitor comprising:

a flash lamp emitting a broad-band optical radiation;

a spectrograph responsive to optical radiation reflected from the wafer; and

a data processing element for processing a first signal from the spectrograph, the first signal representative of emitted optical radiation reflected from the wafer, and determining a process parameter.

12. A process monitor according to claim 11 further comprising a beam forming module operable to collimate the emitted optical radiation.

13. A process monitor according to claim 12 wherein the collimated optical radiation is incident normally to the wafer.

14. A process monitor according to claim 11 wherein a spectrograph integration period is synchronized to the flash lamp.

15. A process monitor according to claim 11 wherein a second signal representative of optical radiation reflected from the wafer during a period when the flash lamp is not emitting broad-band optical radiation is processed by the data processing element and subtracted from the first signal to determine a process parameter.

16. A process monitor according to claim 11 wherein a third signal representative of the intensity of the emitted radiation is processed by the data processing element to normalize the first signal.

17. A process monitor according to claim 16 wherein the normalized first signal is processed by the data processing element to determine the process parameter.

18. A process monitor according to claim 11 wherein the process parameter further comprises a thickness of a layer carried by the wafer.

19. A process monitor according to claim 11 wherein the process parameter further comprises a deposition rate of a layer carried by the wafer.

20. A process monitor according to claim 11 wherein the process parameter further comprises a process endpoint.

21. A method of monitoring a process and for determining process parameters during a plasma process of a wafer, the method comprising

providing a flash lamp emitting a broad-band optical radiation;

providing a spectrograph responsive to optical radiation reflected from the wafer; and

providing a data processing element for processing a first signal from the spectrograph, the first signal representative of emitted optical radiation reflected from the wafer, and determining a process parameter.

22. A method of monitoring a process as recited in claim 21 further comprising providing a beam forming module operable to collimate the emitted optical radiation.

23. A method of monitoring a process as recited in claim 22 wherein the collimated optical radiation is incident normally to the wafer.

24. A method of monitoring a process as recited in claim 21 further comprising synchronizing a spectrograph integration period to the flash lamp.

25. A method of monitoring a process as recited in claim 21 further comprising processing a second signal representative of optical radiation reflected from the wafer during a period when the flash lamp is not emitting broad-band optical radiation and subtracting the processed second signal to determine a process parameter.

26. A method of monitoring a process as recited in claim 21 further comprising processing a third signal representative of the intensity of the emitted radiation to normalize the first signal.

27. A method of monitoring a process as recited in claim 26 further comprising processing the normalized first signal to determine the process parameter.

28. A method of monitoring a process as recited in claim 21 wherein the process parameter further comprises a thickness of a layer carried by the wafer.

29. A method of monitoring a process as recited in claim 21 wherein the process parameter further comprises an etch rate of a layer carried by the wafer.

30. A method of monitoring a process as recited in claim 21 wherein the process parameter further comprises a deposition rate of a layer carried by the wafer.

31. A method of monitoring a process as recited in claim 21 wherein the process parameter further comprises a process endpoint.